

4.0 AIRFIELD AND LANDSIDE ALTERNATIVES ANALYSIS

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The objective of the airfield and landside alternatives analysis is to identify a set of possible development options that will accommodate Lunken Airport's projected airside operational requirements and landside hangar, apron and roadway access requirements.

The following analysis examines the three long-range development options that are based on the findings in Chapter 3.0 *Demand/Capacity and Facility Requirements* analysis. Preferred elements from the various alternatives can be combined to form a fourth hybrid Alternative.

The evaluation of the three selected airport development alternatives is detailed in the following five sections:

- Summary of Initial Study Findings
- Evaluation Criteria
- Identification of Airfield and Landside Alternatives
- Evaluation of Alternatives
- Conclusions and Recommendations

4.1 Summary of Initial Study Findings

The following is a summary of Lunken Airport's physical characteristics and long-range airport planning factors that form the foundation for the airfield and landside development alternatives analysis:

- The total existing Lunken Airport land area is approximately 1,024 acres (including approximately 36 acres of aviation easement).
- Twenty two land lease contracts totaling approximately 80 acres are currently in effect at Lunken Airport. These contracts are managed by the City's Department of Transportation and Engineering, Aviation Division.

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- Eight corporate lease areas located along Wilmer Avenue total approximately 26 acres. No additional corporate aviation lease areas are available along Wilmer Avenue.
- Two full service Fixed Base Operators (FBO's) lease approximately 19 acres of land. Midwest Jet Center is located on Wilmer Avenue and Million Air is located on Airport Road. The two FBO lease areas cannot be expanded without affecting the adjacent tenant lease areas.
- Eleven Specialized Aviation Service Operators (SASO's) lease approximately 40 acres of property along Airport Road. No additional SASO lease areas are available along Airport Road.
- The primary Runway 3R-21L has a Category I precision approach and the crosswind Runway 7-25 has a non-precision Global Positioning System (GPS) approach. The secondary Runway 3L-21R, which is located 2,100 feet to the west of Runway 3R-21L, is used primarily for pilot training and is equipped for visual approach procedures.
- The 11 existing corporate hangars located along Wilmer Avenue support approximately 85 based aircraft and the 20 hangars along Airport Road support approximately 177 based aircraft.
- The critical FAA runway safety requirement for Lunken Airport is to remove the structures that are located in the Runway 7 extended Runway Safety Area (RSA) (600 feet by 300 feet). This requires that Hangar 3 and a 300 foot section of Airport Road be relocated outside the RSA. It has been proposed that Hangar 3 be dismantled and relocated to a site on the Lunken golf course and be utilized as an Aviation Museum.
- Other major airspace and aircraft safety issues to be addressed in the Alternatives Analysis include a new Air Traffic Control Tower (ATCT) to provide complete visibility of the six runway approach zones and all existing and future runway and taxiway aircraft operating areas. Currently a portion of the approach area of Runway 21R is obstructed from the ATCT line of sight.
- Other aviation facilities included in the evaluation of the airfield and landside alternatives are the Lunken Airport terminal building, the joint-use fire station, airport maintenance facilities, and the airfield drainage water pumping station.
- Lunken Airport currently has approximately 262 based aircraft. The projected annual growth rate of 1.0 percent for piston engine aircraft, and

an approximate growth rate of 5.0 percent for corporate jet aircraft, results in the design year 2022 projection of 352 based aircraft.

- A primary runway length of 7,000 feet is required to accommodate the projected design year corporate aircraft (Gulfstream G-550) during a hot day (96 degrees F) and maximum takeoff weight conditions. The G-550 will also require Runway 3R-21L pavement strength of approximately 91,400 pounds for its dual landing gear loading. For anticipated manufacturer changes to the G-550, it is recommended that the pavement strength be designed for 100,000 pound dual wheel loading.
- The annual and peak hour capacity of the existing system of three runways is sufficient to accommodate the projected aviation demand for the year 2022.
- Due to the fully developed corporate lease areas along Wilmer Avenue, three additional 4.0 acre corporate lease areas are required to be developed on other areas of the Airport by the year 2022. Each of the proposed corporate lease areas is intended to support five corporate jet aircraft.
- Each of the two FBO lease areas will require an expansion of approximately 6.0 acres by the design year 2022. Each FBO expansion area will support five future corporate jet aircraft.
- The fully developed SASO lease areas along Airport Road will require three additional 4.0 acre lease areas that will each support 13 future corporate jet aircraft.
- The year 2022 requirement for 26 additional single and twin engine aircraft can be accommodated in the recently developed south airfield T-Hangar development area.

4.2 Evaluation Criteria

Four evaluation criteria were considered in evaluating the three preliminary airfield development alternatives:

- Airfield Operational Efficiency
- On-Airport Land Use Flexibility
- Capital Development Costs
- Land Use Compatibility with Area Communities

4.2.1 Airfield Operational Efficiency

FAA Design Group III aircraft (wing span 79 - 118 feet) and approach Category 'C' aircraft (121 - 141 knots) transport aircraft design criteria were used to determine the optimum landing requirements of each airfield and landside alternative. The primary airfield operational issues to be addressed in the alternatives analysis include the following factors:

- Decrease runway crossings by providing by-pass aprons, additional taxiways, and alternate taxiway routes between the Wilmer Avenue hangar area and the Airport Road hangar area.
- Provide the Air Traffic Control Tower (ATCT) unobstructed visibility of all runway approach zones, all runways and all taxiways.
- Provide a plan for removing all obstructions from the extended Runway Safety Areas (RSA's) and Runway Protection Zones (RPZ's) for each of the six runway ends.
- Provide runway capacity improvements that will accommodate the design aircraft (G-550). The primary runway capacity improvement project to be evaluated is the extension of Runway 3R-21L to a length of 7,000 feet, and a parallel taxiway for Runway 3R-21L.
- Other operational efficiency factors will include the relationship of the proximity of the design year Corporate, FBO, and SASO development areas in relation to the aircraft taxi routes to the six runway ends.

4.2.2 On-Airport Land Use Flexibility

The On-Airport Land Use Flexibility evaluation criterion is used to gauge each alternative's ability to adequately meet the runway system, tenant hangar/apron requirements, surface access, and expansion flexibility needs of the primary airport users. This criterion will also include the ability of each alternative to provide potential revenue generation from excess Lunken Airport property.

4.2.3 Capital Development Costs

The Capital Development Cost criterion compares the relative development costs of each alternative. Major development items and related costs are summarized in a later tabular format. The capital development costs include only aviation-related projects that are typically eligible for FAA funding through the current Airport Improvement Program (AIP) grant program. These projects include obstruction removal, project site preparation, surface water drainage, runways, taxiways, terminal area aprons, public parking, land acquisition, NAVAIDS, access roads, airfield service road tunnels, airfield maintenance facilities, and noise mitigation projects within the design year 65 DNL noise contour. More refined construction cost estimates will be prepared after the Airport Layout Plan (ALP), and the project phasing schedule has been developed.

All private lease area development projects such as site preparation, hangars, aprons, access taxiways, utilities, parking lots, and office parks are not eligible for AIP funding and will not be included in the capital cost evaluation.

4.2.4 Land Use Compatibility with Area Communities

Based on FAA standards, the year 2022 FAA Integrated Noise Model (DNL) noise contours are utilized as the measure of noise impact to the adjacent communities. The number of existing and planned residential and public facilities within the 65 DNL contour, the FAA limit for funding, can provide a relative level of comparison of the potential environmental impacts of the three runway extension alternatives.

Other environmental considerations include a comparison of the different alternatives related to their compatibility with adjacent land uses such as

the Lunken playfield/golf course and airport perimeter bikeway/walkway. The recommended aircraft noise mitigation projects from the Lunken Airport FAR Part 150 Study will be included with all three runway extension alternatives.

4.3 Identification of Airfield and Landside Alternatives

The airfield and landside alternatives identified for Lunken Airport were formulated to address the long-range (2022) development needs of the airport's existing and future aviation users. In this section, the facility development plans are preliminary and will be refined in later sections of the study as the preferred airfield and landside development alternative is identified and refined.

The three airfield alternatives and their related landside facility requirements are described in the following sections:

- Alternative A - Mid-Field Development Area
- Alternative B - Airport Road Development Area
- Alternative C - North Airfield Development Area

4.3.1 Alternative A – Mid-Field Development Area

As shown on **Exhibit 4-1**, this long-range airside and landside facility expansion alternative includes the potential development of approximately 140 acres of vacant property that is located between the two parallel runways. This area of the airport is currently utilized for surface water detention purposes and for helicopter pilot training and banner towing and blimp staging operations. The major airfield and landside elements of the Midfield Development Alternative include the following 11 capital improvement projects:

A-1 EXTEND RUNWAY 3R BY 899 FEET: The 7,000 foot Runway 3R-21L length requirement is addressed by extending Runway 3R by 899 feet to the south. Due to the hillside located south of the Ohio River, this runway extension alternative maintains the Runway 3R arrival threshold in its current location. With the runway extension, the Group III design aircraft (G-550) will have the capability to operate at MTOW on hot days. The extension of Runway 3R will also allow corporate jets to use a lower engine thrust setting on take-off, maintain a higher departure altitude over the northern communities and also allow a decrease in the amount of engine reverse thrust needed for aircraft landing on Runway 21L, which provides further noise reduction impacts on adjacent land uses.

The requirement for a precision approach (see Glossary) to Runway 3R, begins at the proposed runway end threshold and will be affected by the existing topographic obstructions located on the hills approximately 10,000 feet to the south of Runway 3R. The controlling obstruction to a 50:1 Federal Aviation Regulation (FAR) Part 77 precision approach obstruction control surface to Runway 3R is the top of a water tank that has an elevation of 990 MSL (see Glossary). This will result in a 288 foot violation to the 50:1 obstruction control surface. Even with a longer displaced threshold to Runway 3R, it is not feasible to develop a precision approach procedure to Runway 3R. It is possible to safely maintain the existing non-precision approach to Runway 3R if the existing arrival threshold is utilized.

The 899 foot runway extension will be utilized for Runway 3R departures to the north and Runway 21L departures to the south. Sufficient room is available to the south of Runway 3R for the relocation of the existing localizer antenna that is required for the instrument approach to Runway 21R, as well as the 1,000 foot by 500 foot requirement for the RSA.

A-2 RUNWAY 7 EXTENDED SAFETY AREA (RSA): In order to address the FAA's extended Runway 7 RSA requirement of maintaining a FAA Group III-B aircraft obstruction-free area of 600 feet by 300 feet, Alternative-A shows the option of relocating the threshold of Runway 7 by 100 feet. This project will maintain the south airport levee in its existing location, provide a 75 foot right-of-way for relocating Airport Road, and will include the removal of Hangar 3 and an airport maintenance building. With the resulting 100 foot relocated threshold, the length of Runway 7-25 will be decreased from 5,128 feet to 5,028 feet.

A-3 RUNWAY 3R-21L PARALLEL TAXIWAY: A parallel taxiway is proposed to be located 400 feet west of the centerline of Runway 3R-21L. This project is required for operational efficiency and runway crossing safety considerations. This project will impact approximately 9.0 acres of the mid-field surface water detention basin. It is proposed that the drainage area located east of Runway 3R-21L be expanded to accommodate the loss in mid-field drainage area.

A-4 TAXIWAY 'C' RELOCATION BY 400 FEET: This taxiway relocation project is proposed to allow additional phased development of the Airport Road lease areas. This project will impact 2.7 acres of the mid-field surface water detention basin. It is proposed that the existing drainage area located east of Runway 3R-21L be relocated to accommodate the loss in mid-field drainage area.

A-5 NORTH CORPORATE LEASE AREA: Potential areas for the expansion of corporate lease areas include the development of the 10.8 acre site that is located adjacent to Taxiway 'A' on the north airfield. This project will require the closure of the west segment of Taxiway 'D' and approximately 4.0 acres of the golf course. Access to this site will be

provided by a new access road from Wilmer Avenue that is adjacent to the southern edge of the golf course.

A-6 MID-FIELD CORPORATE LEASE AREA: Four additional 4.5 acre corporate lease parcels are shown for development in the mid-field between Runway 3R-21L and Runway 3L-21R. This project will require an access road from Airport Road and a 100 foot by 30 foot tunnel under the proposed relocated Taxiway 'C'. This project will impact the existing drainage basin and requires that the existing mid-field aircraft operations area be reconfigured.

A-7 FBO LEASE AREA EXPANSION: The Midwest Jet Center FBO lease area is shown to be expanded toward the north. This will require the relocation of corporate lease parcels 36 and 39 and results in a FBO lease area totaling approximately 16 acres.

With the relocation of Taxiway 'C' by 400 feet, the Million Air FBO lease area on Airport Road can be expanded to the north and to the west. The expanded Million Air FBO lease area will total approximately 17 acres.

A-8 SASO LEASE AREA EXPANSION: The development of future SASO lease areas includes two 4.5 acre SASO parcels located in the mid-field area. These lease areas will utilize the mid-field access road and tunnel from Airport Road that was described in the previous corporate lease area expansion project. This new SASO lease area will require that the existing mid-field drainage area be relocated to the east side of Runway 3R-21L. With the relocation of Taxiway 'C', an additional 12.0 acres of land is available for the expansion of the existing Airport Road SASO leases areas.

A-9 MID-FIELD AIR TRAFFIC CONTROL TOWER: With the proposed Corporate and SASO development in the mid-field area, the Air Traffic Control Tower will have to be relocated to a site in the mid-field that will provide controller visibility of the six runway approach zones as well as the runway and taxiway aircraft operation areas.

A-10 HANGAR 3 AVIATION MUSEUM SITE: With the required relocation of Hangar 3 from the Runway 7 RSA, it has been suggested that Hangar 3 be relocated and redeveloped as a Lunken Aviation Museum. A 7.3 acre site has been identified adjacent to the Runway 25 aircraft hold apron. This site requires that approximately 7.0 acres of the golf course be redeveloped for the Aviation Museum project.

A-11 AERONAUTICAL TRAINING COLLEGE: For airport revenue generation purposes, it is proposed that the approximate 16 acre vacant parcel of airport property that is located south of the south airport levee be developed for an aeronautical training college or other future aviation related land uses. This project could be developed in conjunction with pilot and maintenance training programs, local university aviation training programs or as a remote campus for a nationally recognized aviation training college. Student parking could be located in portions of the RPZ of Runway 7. If student flight training programs are provided, airside aprons and hangars would be provided by FBO's or SASO's.

A-12 AIRFIELD DRAINAGE: The development of the mid-field area will require that the existing 48 acre, 10 foot deep storm water retention basin be filled in and a new water retention basin and pump stations be developed on the east side of Runway 3R-21L. This project will require coordination and approval by the U.S. Army Corps of Engineers.

4.3.2 Alternative B - Airport Road Development Area

As shown on **Exhibit 4-2**, the second long range facility expansion alternative considers the feasibility of relocating Taxiway 'C' 1,000 feet to the north and developing the additional 43 acres of land for hangars and aprons. Alternative B includes the following ten airfield and landside projects:

B-1 EXTEND RUNWAY 21L BY 899 FEET: The extension of Runway 21L into the golf course will require the relocation of the Instrument Landing System (ILS) and the removal of all obstructions to the 50:1 obstruction control surface. This project will require approximately 14.0 acres of the golf course for the runway extension, glide slope antenna, approach lighting system, and RSA relocation.

B-2 RUNWAY 7 PROTECTION ZONE (RPZ): The second option for addressing the FAA requirement for providing a 600 feet by 300 feet RSA for Runway 7 without affecting the existing 5,128 feet length of Runway 7-25, is to relocate the south airport levee 600 feet to the south along the north side of Kellogg Avenue. The existing Airport Road connection with Wilmer Avenue would be closed. This levee relocation project requires the acquisition of approximately 7.0 acres of commercial property and the removal of three structures that are located within the Runway Protection Zone (RPZ) (1,000 feet x 500 feet x 700 feet). One of these structures is a convenience market with seven fuel pump islands and the related underground fuel storage tanks. Gas stations within RPZ's are considered by the FAA to be a major aircraft operational safety issue.

B-3 RUNWAY 3R-21L PARALLEL TAXIWAY: A parallel taxiway is proposed to be located 400 feet west of Runway 3R-21L. This parallel

taxiway will improve airfield safety as well as increase the peak hour capacity of Runway 3R-21L.

B-4 TAXIWAY 'C' RELOCATION 1,000 FEET TO THE NORTH: To provide for the long range Corporate, FBO, and SASO hangar and apron requirements, Taxiway 'C' in this alternative relocates 1,000 feet to the north. This project will require that the existing mid-field drainage area be relocated to the east side of Runway 3R-21L. The existing midfield special aircraft operations area would be reconfigured to include a 2,000 foot by 400 foot operations area.

B-5 CORPORATE LEASE EXPANSION AREA: With the relocation of Taxiway 'C', it is proposed that Hangars (1, 2, and 3), located adjacent to Runway 7, be removed and four corporate hangar lease areas be developed in this 13.7 acre area. This project will include partial parallel taxiways for Runway End 3L and Runway End 7.

B-6 FBO LEASE EXPANSION AREA: Midwest Jet Center is shown to be expanded to the north with the acquisition of the 2.7 acre Lease Area 39. This additional property and the paving of the area adjacent to Taxiway 'A' results in a total useable lease area of 13.0 acres.

The Million Air FBO lease area is shown to expand north by approximately 12.4 acres. Under this project, Million Air will share a central apron taxiway with the expanded SASO lease areas.

B-7 SASO LEASE EXPANSION AREA: The long range SASO lease area is located to the east of Runway End 3L and adjacent to the expanded Million Air FBO expansion area. This 20 acre site can accommodate five, 3.3 acre lease areas, which include the three displaced SASO lease areas

on Airport Road. An additional 4 acre SASO lease area is shown to be developed on the west side of Runway End 3L.

B-8 RELOCATED AIR TRAFFIC CONTROL TOWER: The ATCT is shown to the north airfield near the Runway 25 hold apron. All runway approach zones and aircraft operating areas on the airport will be visible from this site. Site access will be provided from Wilmer Avenue.

B-9 HANGAR 3 AVIATION MUSEUM SITE: With the removal of Hangar 3 from the Runway 7 RSA in this alternative, it is relocated to a 5.5 acre site that is adjacent to the north airfield ATCT site. Access to the museum site will be via a new road from Wilmer Avenue that will also support the relocated ATCT. Approximately 4.1 acres of the golf course will be required for the proposed museum site.

B-10 AIRPORT OFFICE PARK: For long-range airport operating revenue generation purposes, a 20 acre airport office park is shown on a vacant parcel of Lunken Airport land that is located on the south side of the south airport levee. Development of this alternative requires the relocation of 2,200 feet of the levee and a new south airport access road that would connect with Kellogg Avenue. Approximately ten acres of commercial property along Kellogg Avenue, which includes an automobile salvage yard is proposed to be acquired. Proposed airport office park land uses are compatible with airport operations in this area. It is envisioned that an environmental audit and clean-up of the salvage yard will be required as part of this office park development project. The levee relocation project will be in conjunction with the Runway 7 RSA levee relocation project.

B-11 AIRFIELD DRAINAGE: The development of the mid-field area will require the filling of the 48 acre 10 foot deep mid-field storm water retention basin. A new storm water retention basin and pumping station is

proposed to the east of Runway 3R-21L, adjacent to the Little Miami River levee. This project will require coordination and approval by the U. S. Army Corps of Engineers.

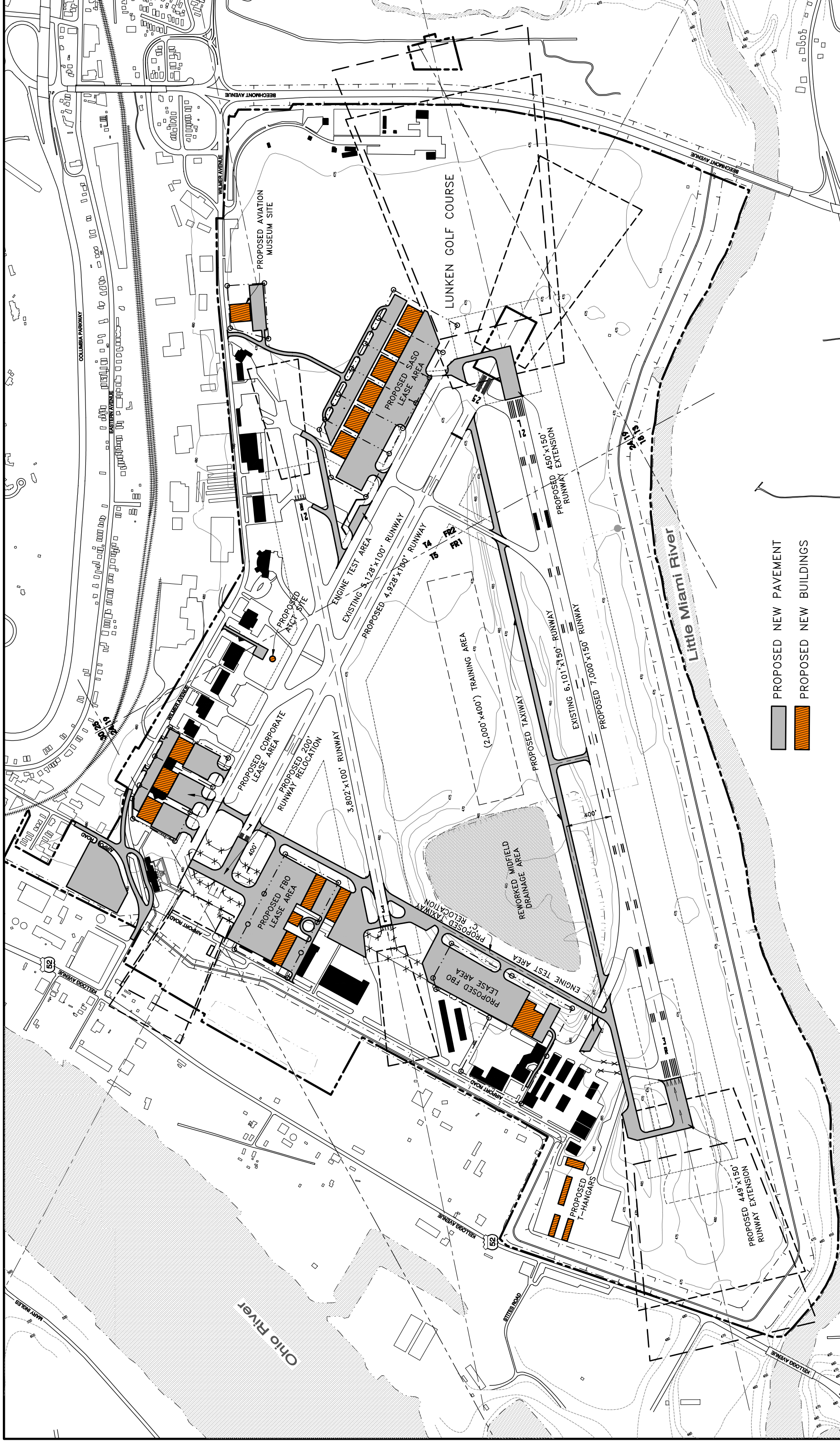
4.3.3 Alternative C - North Airfield Development Area

As shown on **Exhibit 4-3**, the third option explores redeveloping to the north. This option would impact the current public recreation use of the property north of the airport facilities.

Key aspects of Alternative C include the following nine capital development projects:

C-1 EXTEND RUNWAY 3R BY 450 FEET AND RUNWAY 21L BY 449 FEET: To meet the 7,000 foot runway length requirement, Runway 3R is extended by 450 feet and Runway 21L by 449 feet. This split runway extension project will require approximately 8.0 acres of the golf course and will also require the navigational aids on both ends of the runway to be relocated.

C-2 RUNWAY 7 RELOCATED THRESHOLD BY 200 FEET: In order to address the FAA's extended Runway 7 RSA requirement of maintaining an obstruction free area of 600 feet by 300 feet, Alternative C shows the option of relocating the threshold of Runway 7 by 200 feet. This project will maintain the south airport levee and Airport Road in their existing locations and remove Hangar 3 from the RSA. With the resulting 200 foot relocated threshold, Runway 7-25 will have a total length of 4,928 feet. This runway length is of sufficient length to accommodate the cross-wind runway requirements of the majority of the Group III-B aircraft fleet mix.



C-3 RUNWAY 3R-21L PARALLEL TAXIWAY: Consistent with the previous two Group B-III aircraft runway length alternatives, a full 7,000 feet by 50 feet parallel taxiway with a mid-runway exit is proposed for Alternative C.

C-4 TAXIWAY 'C' RELOCATION BY 400 FEET: This taxiway relocation project is proposed for the redevelopment of the old Hangars (1, 2 and 3), and the expansion of the existing FBO and SASO lease areas along Airport Road. This project will require the expansion of the existing mid-field drainage area to allow for the displacement resulting from the Runway 3R-21L parallel taxiway and the relocated Taxiway 'C'.

C-5 CORPORATE LEASE AREA EXPANSION ALONG WILMER AVENUE: Three 3.4 acre corporate lease parcels are proposed to be located on the area currently leased by Midwest Jet Center.

C-6 FBO LEASE AREA ON AIRPORT ROAD: A new 11.3 acre Midwest Jet Center FBO lease area is shown to be developed on the site of the old Hangars 1, 2, and 3. The Million Air FBO lease area on Airport Road is to be expanded by approximately 8.3 acres to the north in this alternative.

C-7 SASO NORTH AIRFIELD DEVELOPMENT AREA: A new 25.7 acre site on the north airfield is to be developed for the replacement of the three SASO lease areas on Airport Road and three additional 3.4 acre SASO lease areas. This project will require the acquisition of 11.0 acres of the golf course and construction of a 1,000 foot section of taxiway for corporate hangar access to Taxiway 'A'. Site access will be from a new two lane road from Wilmer Avenue.

C-8 RELOCATED AIR TRAFFIC CONTROL TOWER: The ATCT is shown to be relocated 250 feet to the east of the existing ATCT site. This

ATCT location will provide an unobstructed view of all runway approach zones and aircraft operating areas.

C-9 HANGAR 3 AVIATION MUSEUM SITE: The third alternative location for the Hangar 3 museum is a site on Wilmer Avenue adjacent to Airport Lease Area 47. This project will require approximately 4.0 acres of the golf course.

4.4 Evaluation of Alternatives

The technical evaluation of the three long-range Lunken Airport development alternatives was based on the four previously described evaluation criteria:

- Airfield Operational Efficiency
- On-Airport Land Use Flexibility
- Capital Development Costs
- Land Use Compatibility with Area Communities

4.4.1 Airfield Operational Efficiency

The airfield development alternatives presented three options for extending Runway 3R-21L to a length of 7,000 feet, and three alternatives for addressing the Runway 7 RSA requirement. The options for future taxiway system development included the proposed parallel taxiway for Runway 3R-21L and the relocation of Taxiway 'C'. Factors related to the operational efficiency of the three alternatives are as follows:

ALTERNATIVE A - MID-FIELD DEVELOPMENT AREA:

(Airfield Operating Efficiency)

- The option for extending Runway 3R by 899 feet to the south can be accomplished with a minimum amount of engineering effort. Minor cut and fill is required and sufficient room is available for the relocation of the existing localizer antenna. The relocated Runway Protection Zone (RPZ) will require approximately 15 acres of obstruction control

easement over the vacant wooded land south of Kellogg Avenue. Due to the existing hills on the south side of the Ohio River, the existing Runway 3R landing threshold will remain in the same location.

- The option for providing the FAA standard RSA for Runway 7 by relocating the Runway 7 threshold by 100 feet, results in a reduced length of Runway 7-25 that would total 5,028 feet. For Group III-B corporate jet aircraft, a runway length of approximately 5,000 feet is considered sufficient for the majority of this group of aircraft.
- The proposed parallel taxiway for Runway 3R-21L and the relocated Taxiway 'C' will eliminate approximately 50 percent of the existing runway crossings by separating aircraft going to and from the Airport Road hangar areas. The relocated Taxiway 'C' in combination with the new parallel taxiway will also improve the head-to-head aircraft taxing conflicts that exist today. The midfield development alternative also requires that a two lane tunnel be developed as part of the proposed Taxiway 'C' project.
- The proposed relocation of the ATCT to the midfield area will provide the controllers with clear views of the proposed runway system and the north corporate hangar taxiways that are currently not visible from the existing ATCT site. One negative aspect of the midfield ATCT site is that the controllers will be required to keep a 360 degree view of the airport versus the existing 180-degree view from the existing ATCT site.
- The midfield location of the future Corporate and SASO lease areas will decrease the taxi times of these aircraft going to and from the system of three runways.
- The midfield helicopter training, blimp staging and banner towing operations areas will not be affected.

ALTERNATIVE B - AIRPORT ROAD DEVELOPMENT AREA:

(Airfield Operating Efficiency)

- The second alternative considers the implications for extending Runway End 21L by 899 feet to the north. Like the Runway 3L extension alternative, only minor engineering issues are required and the glide slope and approach lighting system can be easily relocated. The 50:1 obstruction control surface can be relocated and the 50:1 obstruction control surface can be maintained over the Beechmont Avenue levee. Approximately 37 acres of Avigation Easement will be

required over the vacant flood plain area that is located north of Beechmont Avenue. This alternative will not require a displace threshold as is required with the extension of Runway 3R.

- The option of relocating the south airport levee 600 feet to Kellogg Avenue in order to meet the Runway 7 RSA obstruction issue significantly improves the safety of Runway 7-25 by removing all obstructions from the Runway 7 RSA and RPZ. This project would require the acquisition and removal of the gas station that is located at the intersection of Kellogg Avenue and Wilmer Avenue.
- The parallel taxiway for Runway 3R-21L and the relocated Taxiway 'C' significantly improve the operating efficiency of the airfield system.
- The north airfield site for the ATCT will provide controller visibility of the entire airfield system, but like Alternative - A, the controllers will have to maintain a 360 degree view of the airfield which may require an additional controller.
- The mid-field helicopter training, banner towing and blimp staging area operations will not be affected.

ALTERNATIVE C - NORTH AIRFIELD DEVELOPMENT AREA:

(Airfield Operating Efficiency)

- The third Runway 3R-21L extension alternative presents a split runway-option extending both to the north and to the south. This alternative requires that the threshold of Runway 25 be in close proximity to the threshold of Runway 21L. This configuration may cause problems for pilots in visually identifying the landing threshold when approaching Runway 25.
- The Runway 7 RSA obstruction clearance alternative of decreasing the length of Runway 7 by 200 feet, results in a Runway length of 4,928 feet. Some of the larger Group III-B corporate jets may have to operate under restricted gross weight take-off conditions with a runway length of less than 5,000 feet.
- The Runway 3R-21L parallel taxiway and the relocated Taxiway 'C' will have the same safety and operational benefits as the other two taxiway system alternatives.
- The relocation of the ATCT to a point 250 feet in front of the existing ATCT site will provide visibility of the proposed airfield system.

- The midfield helicopter training, banner towing and blimp staging operations area will not be affected.
- The north corporate and SASO development area provides the aircraft operators with direct access to the primary Runway 3R-21L, which in turn decreases the number of runway crossings.
- The relocation of Midwest Jet Center to the Airport Road lease area will decrease aircraft runway system crossings to and from the primary Runway 3R-21L.

SUMMARY - AIRFIELD OPERATING EFFICIENCY: The following is a summary of the operational efficiency of the three airfield alternatives as they relate to FAA airport design criteria, runway crossing conflicts and control tower line-of-sight criteria. Each of these is shown on **Table 4.1**.

- All three alternatives meet the requirement for extending Runway 3R-21L to a length of 7,000 feet, as well as maintaining the precision approach to Runway 21L and the non-precision approach the Runway 3R.
- The desire for a precision approach to Runway 3R is not feasible due to the close proximity of the hills that are located to the south of the Ohio River.
- The analysis for the extension of Runway 3R-21L indicates that the extension of Runway 3R to the south appears to have the least construction impact but will require that the Runway 3L landing threshold be maintained in its current location. The extension of Runway 21L will not require a displaced threshold, but will cause landing conflicts with Runway 25.
- The preferred solution (as per FAA criteria) for addressing the Runway 7 RSA issue (based on operational efficiency) is to relocate the south airfield levee and remove all of the obstructions from the RPZ.
- With the development of a new parallel taxiway for Runway 3R-21L and the relocation of Taxiway 'C', all three landside development alternatives provide a significant decrease in runway crossings.

<p>Table 4-1 Cincinnati Municipal Airport-Lunken Field AIRFIELD OPERATIONAL EFFICIENCY SUMMARY</p>			
Airfield Alternatives	FAA ARC C-III Design Criteria	Runway Crossing Conflicts	Control Tower Line of Sight
"A"- Midfield Development Area	<ul style="list-style-type: none"> •Requires 29 acres of land south of Kellogg Avenue •Non precision approach to R/W 3R can be maintained •Provides for G550 and BBJ runway takeoff length requirements •Restricts R/W 7 RPZ to ARC B-II and requires 100' less decrease in runway length 	<ul style="list-style-type: none"> •Major decrease in R/W 3L/21R crossings •Major decrease in Taxiway C conflicts •Major decrease in aircraft taxing distances 	<ul style="list-style-type: none"> •Major increase in airfield visibility •Minor increase in controller workload
"B"- Airport Road Development Area	<ul style="list-style-type: none"> •Requires 27 acres of easement north of Beechmont Avenue •Precision approach to R/W 21L can be maintained •Provides for G550 and BBJ runway takeoff length requirements •Provides for R/W 7 C-III RPZ and RSA criteria 	<ul style="list-style-type: none"> •Minor decrease in R/W 3L/21R crossings •Minor decrease in aircraft taxing distances •Minor decrease in Taxiway C conflicts 	<ul style="list-style-type: none"> •Minor increase in airfield visibility •Minor decrease in controller workload
"C"- North Development Area	<ul style="list-style-type: none"> •Requires 5 acres of easement south of Kellogg Avenue •Requires 15 acres of easement north of Beechmont Avenue •Precision and non precision approach to R/W 3R/21L can be maintained •Provides R/W 7 C-III RPZ and RSA criteria and allows a 40' decrease in R/W 7/25 length 	<ul style="list-style-type: none"> •Minor decrease in R/W 3L/21R crossings •Minor increase in Taxiway C conflicts 	<ul style="list-style-type: none"> •Minor increase in airfield visibility •No increase in controller workload

Source: PB Aviation

- If the extension to Runway 3R is implemented and the south airfield hangar area is expanded to the north, the ATCT will require relocation to the midfield area between the two parallel runways.

4.4.2 On-Airport Land Use Flexibility

The primary factors utilized in evaluating the land use flexibility of the three major land uses (Corporate, FBO, and SASO) include the physical relationship of the different land uses, the surface access to each development area, and the potential of each alternative to provide non-aviation revenue sources. Factors related to the flexibility of each of the three landside alternatives are as follows:

ALTERNATIVE A - MID-FIELD DEVELOPMENT AREA:

(On-Airport Land Use Flexibility)

- The mid-field area provides space for four Corporate and two SASO development parcels. Approximately 36 acres of expansion area is available if the surface water drainage basin is relocated to the east of Runway 3R-21L.
- Access to the mid-field will require a two lane tunnel under Taxiway 'C' and a 4,000 foot mid-field access road from Airport Road. Airport Road will require expansion (center left turn lane) due to the increase in traffic.
- The Midwest Jet Center FBO lease area has limited expansion potential due to the corporate lease areas to the north and the airport terminal apron to the south.
- The Million Air FBO lease area can easily be expanded to the north if Taxiway 'C' is relocated.
- The mid-field land use concept will require that both Corporate and SASO land uses be split between the Wilmer Avenue, the Airport Road and the mid-field development areas.
- Alternative A provides a 20 acre development area for an Aeronautical College or other compatible use that could provide additional airport

operating revenues. If the levee is not relocated, this project would be located within the Ohio River flood plain.

ALTERNATIVE B - AIRPORT ROAD DEVELOPMENT AREA:

(On-Airport Land Use Flexibility)

- The Airport Road corporate lease expansion area is separate from the existing Wilmer Avenue corporate lease areas.
- The Midwest Jet Center site has limited expansion potential.
- The Million Air FBO and SASO lease areas can be easily expanded and also have the advantage of having a common apron.
- The 20 acre Airport Office Park site offers the potential for increased airport operating revenues. This site would be outside of the Ohio River flood plain.
- Airport Road, currently a two lane road may have to be upgraded to accommodate the additional ground traffic created by the proposed south airport development. South airport traffic will utilize the new south airfield access road from Kellogg Avenue.

ALTERNATIVE C - NORTH AIRFIELD DEVELOPMENT AREA:

(On-Airport land Use Flexibility)

- The relocation of the Midwest Jet Center FBO to the Airport Road site provides for lease area expansion flexibility.
- The redevelopment of the Midwest Jet Center FBO site for three corporate lease areas keeps the corporate land uses along Wilmer Avenue.
- The Million Air FBO lease area has the flexibility to expand if Taxiway 'C' is relocated.
- The SASO lease area on the north airfield separates this land use from the Airport Road SASO lease areas and this area will require a two lane access road through the golf course from Wilmer Avenue.
- Alternative C provides no additional non-aviation land use development option.

SUMMARY - ON AIRPORT LAND USE FLEXIBILITY: A summary of the land use flexibility of the three alternatives is shown on **Table 4-2**. All three alternatives meet the minimum requirements of providing the long-term land requirements for Corporate, FBO, and SASO tenants.

- Alternative A provides an additional 36 acres of property for the long-term expansion needs of both Corporate and SASO tenants. Utilization of the north airfield site for the relocation of the P&G corporate flight department allows for the maximum utilization of the Wilmer Avenue corporate lease areas.
- Alternative B provides sufficient land area for the expansion of the Million Air FBO lease area and the future SASO lease area requirements. The Airport Office Park development on the south airfield provides a potential non-aviation revenue source.
- Alternative C includes the relocation of Midwest Jet Center to the Airport Road site. This would require the removal of Hangars 1, 2, and 3, and provides Midwest Jet Center the ability to expand.

4.4.3 Capital Development Costs

The capital costs associated with acquiring land, extending Runway 3R-21L, taxiway relocation, mid-field drainage, roadway access, and other projects required to support corporate and general aviation activities over the 20 year planning period are summarized in **Table 4-3**. Capital development costs for the listed projects are based on the airfield and landside projects that are eligible for FAA Airport Improvement Program (AIP) grant funding. Hangar and apron projects that are on airport property that will be leased and developed with private funds are not included in the cost estimate evaluation.

Table 4-2
Cincinnati Municipal Airport-Lunken Field
ON AIRPORT LAND USE FLEXIBILITY SUMMARY

Airfield Alternatives	Aviation Lease Area Expansion Flexibility	Lease Area Surface Access	Non Aviation Commercial Lease Area Expansion
"A"- Midfield Development Area	•25 acres corporate lease area (+13 acres)	•4,200 linear feet for a two-lane access road with 100' X 30' tunnel under proposed Taxiway "C"	•20-acre site for Aeronautics College or other aviation related development provides for alternative source of revenue
	•36 acres for the expansion of Corporate and SASO	•3,100 linear feet Airport Road upgrade for additional traffic	
	•No land required for 900' extension of R/W 3R		
"B"- Airport Road Development Area	•North corporate lease requires golf course land for expansion	•3,800 linear feet two-lane access road for site access	•2,900 linear feet of levee relocation •17-acre south airport commercial lease area
	•Midwest Jet Center expansion	•4,100 linear feet off airport road upgrade for additional traffic	
	•Requires corporate lease area expansion		
"C"- North Development Area	•Minor golf course impact		•20 acres of golf course required •No additional non-aviation commercial land
	•8-acre corporate lease area (+2 acres)-above requirement	•No access road planned	
	•30 acre FBO lease area •20 acres new SASO •5 acre RSA required for 450' extension of R/W 21R	•2,200 linear feet access road for North SASO area	

Source: PB Aviation

<p>Table 4-3 Cincinnati Municipal Airport-Lunken Field ALTERNATIVE DEVELOPMENT COSTS</p>									
FAA AIP Eligible Projects	Unit Cost		Alternative "A"- Midfield Area		Alternative "B"- Airport Road Area		Alternative "C"- North Airfield Area		
	\$	Unit	Quantity	Cost	Quantity	Cost	Quantity	Cost	
R/W 3R/21L extension	\$150	SY	15,000	\$2,250,000	15,000	\$2,250,000	15,000	\$2,250,000	
Taxiways	\$100	SY	89,000	\$8,900,000	78,000	\$7,800,000	77,000	\$7,700,000	
Midfield Tunnel	\$100	SF	3,000	\$300,000					
Obstruction Removal	L.S.		1	\$250,000	1	\$250,000	1	\$250,000	
Avigation Easement	\$10,000	Acre	29	\$290,000	27	\$270,000	5	\$50,000	
Roadways	\$40	SY	30,000	\$1,200,000	26,000	\$1,040,000	18,000	\$720,000	
Utilities	\$100	LF	8,900	\$890,000	7,600	\$760,000	5,400	\$540,000	
Midfield earth & fill	\$3	CY	84,000	\$252,000	726,000	\$2,178,000	88,000	\$264,000	
East airfield drainage	\$3	CY	84,000	\$252,000	726,000	\$2,178,000	88,000	\$264,000	
Control tower relocation	L.S.		1	\$1,500,000	1	\$1,500,000	1	\$1,500,000	
South airfield levee relocation	\$3	CY			260,000	\$780,000			
TOTAL CAPITAL COST				\$16,084,000		\$19,006,000		\$13,538,000	
Contingencies	20%			\$3,216,800		\$3,801,200		\$2,707,600	
Design Fee	10%			\$1,608,400		\$1,900,600		\$1,353,800	
GRAND TOTAL ESTIMATE				\$20,909,200		\$24,707,800		\$17,599,400	

L.S.-Last Survey
Source: PB Aviation

ALTERNATIVE A - MID-FIELD DEVELOPMENT AREA:

(Capital Development Costs)

- The cost estimate for constructing the 11 AIP eligible projects in Alternative A totals \$27.8 million. Unique cost factors of Alternative A include the \$2.5 million associated with providing the mid-field access road, tunnel and utility systems.

ALTERNATIVE B - AIRPORT ROAD DEVELOPMENT AREA:

(Capital Development Costs)

- The cost estimate for constructing the ten AIP eligible projects in Alternative B totals approximately \$29.2 million. Unique cost factors of Alternative B include the \$3.4 million for the relocation of the south airfield levee and the acquisition of the 7.0 acres of property along Kellogg Avenue that is required for the Runway 7 RPZ.

ALTERNATIVE C - NORTH AIRFIELD DEVELOPMENT AREA:

(Capital Development Costs)

- The cost estimate for constructing the nine AIP eligible projects Alternative C totals approximately \$23.2 million. Unique cost factors of Alternative C include the Runway 21R parallel taxiway and the new north airfield access road.

SUMMARY - CAPITAL DEVELOPMENT COSTS:

- With the relatively flat terrain adjacent to both ends of Runway 3R-21L, the cost for extending the runway is relatively the same for all three alternatives. The significant difference in cost between the alternatives is the effort required to fully comply with the Runway 7 RSA issue, the relocation of the south airport levee, and mid-field access road.

4.4.4 Land Use Compatibility with Area Communities

A unit of measure utilized to evaluate the compatibility of the three Runway 3R-21L extension alternatives in this analysis is the design year (2022) DNL noise contours. Another community impact measure utilized in this analysis is the potential loss of recreational acreage resulting from the three development alternatives. A summary of community impacts is shown on **Table 4.4**, and the major areas of community impact are summarized as follows.

Cincinnati Municipal Airport-Lunken Field				
Table 4-4				
COMMUNITY AND ENVIRONMENTAL IMPACT				
Alternatives	Homes Impacted by 65 DNL	Residential Land Use Impacted by 65 DNL	Recreation Land Use Impacted by 65 DNL	Lunken Golf Course Impact
A-Extend R/W 3R by 900'	None	None	•South of Kellogg Avenue (55 acres) •North of Beechmont Avenue (4 acres) •Total 59 acres	•Loss of 5 acres of golf course for commercial development •Total 5 acres
B-Extend R/W 21L by 900'	None	None	•South of Kellogg Avenue (22 acres) •North of Beechmont Avenue (12 acres) •Total 34 acres	•Loss of 2 acres of golf course for air museum •Loss of 10 acres of golf course for R/W 21L RSA •Total 12 golf course acres requite
C-Extend R/W 3R by 450' and 21L by 450'	None	None	•South of Kellogg Avenue (35 acres) •North of Beechmont Avenue (7 acres) •Total 42 acres	•Loss of 20 acres of golf course for hangar and air museum •Loss of 5 acres of golf course for R/W 21L RSA •Total of 25 golf course acres required

Source: PB Aviation

Source: PB Aviation

ALTERNATIVE A - MID-FIELD DEVELOPMENT AREA:

(Land Use Compatibility with Area Communities)

- As Shown on **Exhibit 4-4**, the option of extending Runway 3R by 899 feet to the south results in 34 acres of off-airport property contains within the design year 2022 65 DNL noise contour. These 34 acres of off-airport land south of Kellogg Avenue are zoned Riverfront Recreational/Residential/Commercial and this property is within a wooded flood plain with no existing development. To the north, five acres of off-airport property will be within the 65 DNL contour. This vacant property is also within a flood plain.
- The impacts to the recreation area due to the new corporate hangar, the potential aviation museum, and the 800 foot access road total approximately 14 acres.
- The aviation museum and the aeronautical college projects will add additional traffic Wilmer Avenue.

ALTERNATIVE B - AIRPORT ROAD DEVELOPMENT AREA:

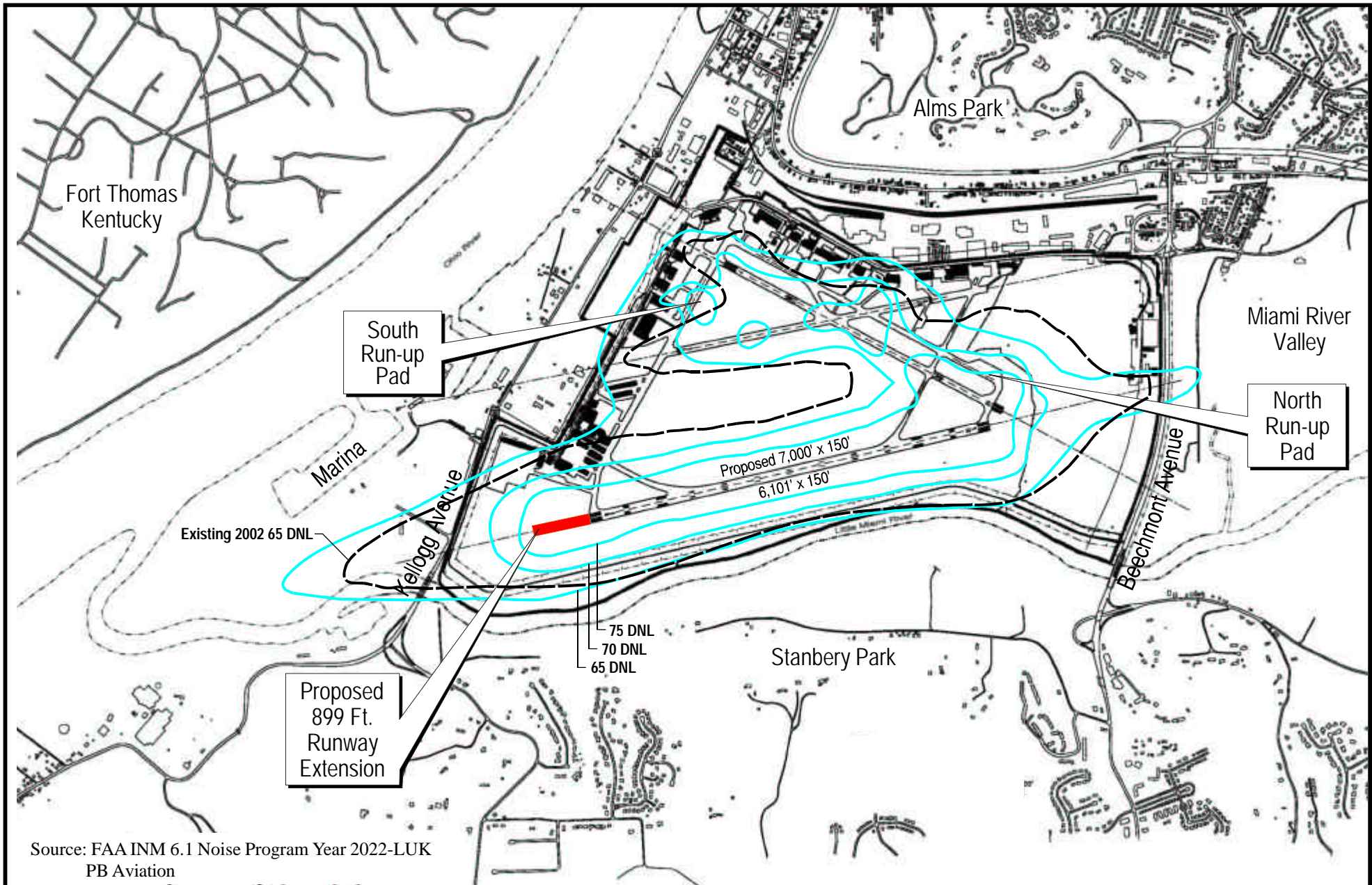
(Land Use Compatibility with Area Communities)

- As shown on **Exhibit 4-5**, the extension of Runway 21L by 899 feet to the north results in 21 acres of off-airport undeveloped property located north of Beechmont Avenue contains within the design year 2022 65 DNL noise contour. To the south of Kellogg Avenue, 11 acres of property is within the 65 DNL contour and is compatible land use according to Federal land use guidelines.
- The Runway 21L extension into the golf course will require the relocation of 12 acres of fairways. The aviation museum, ATCT and access road will impact an additional five acres of the golf course.
- The potential museum and the airport office park off of Kellogg Avenue will result in additional traffic on Wilmer Avenue.

ALTERNATIVE C - NORTH AIRFIELD DEVELOPMENT AREA:

(Land Use Compatibility with Area Communities)

- As shown on **Exhibit 4-6**, the option of extending both ends of Runway 3L-21R by approximately 450 feet results in 27 acres of undeveloped off-airport property to the north and five acres of undeveloped off-airport property on the south contained within the design year 2022 65 LDN noise contour.



**Cincinnati Municipal Airport - Lunken Field
AIRPORT MASTER PLAN STUDY UPDATE**

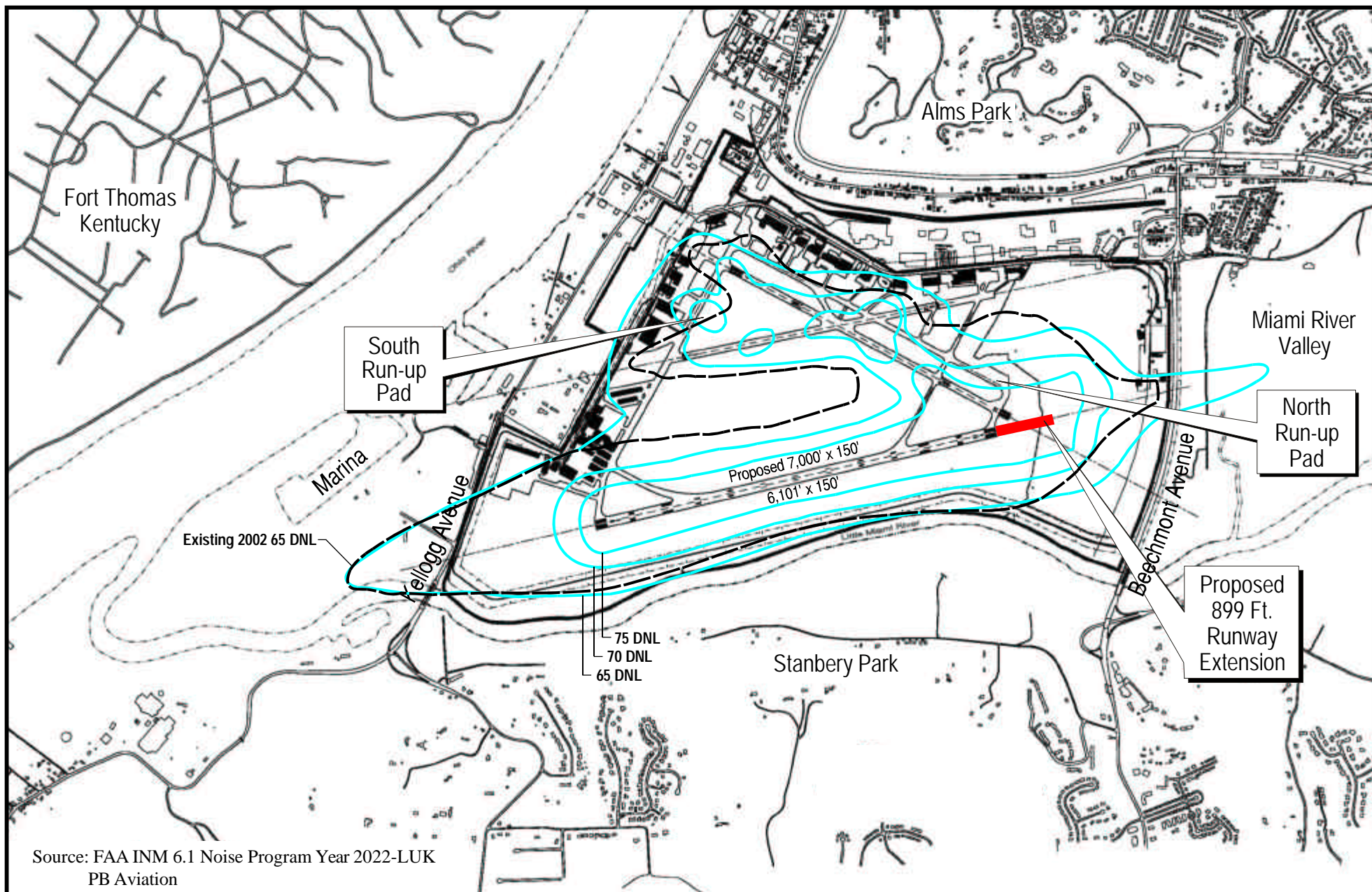
0 1,000' 2,000'
1" = 2,000'



**ALTERNATIVE A
EXTEND RUNWAY 3R 899 FEET**

EXHIBIT

4-4



**Cincinnati Municipal Airport - Lunken Field
AIRPORT MASTER PLAN STUDY UPDATE**

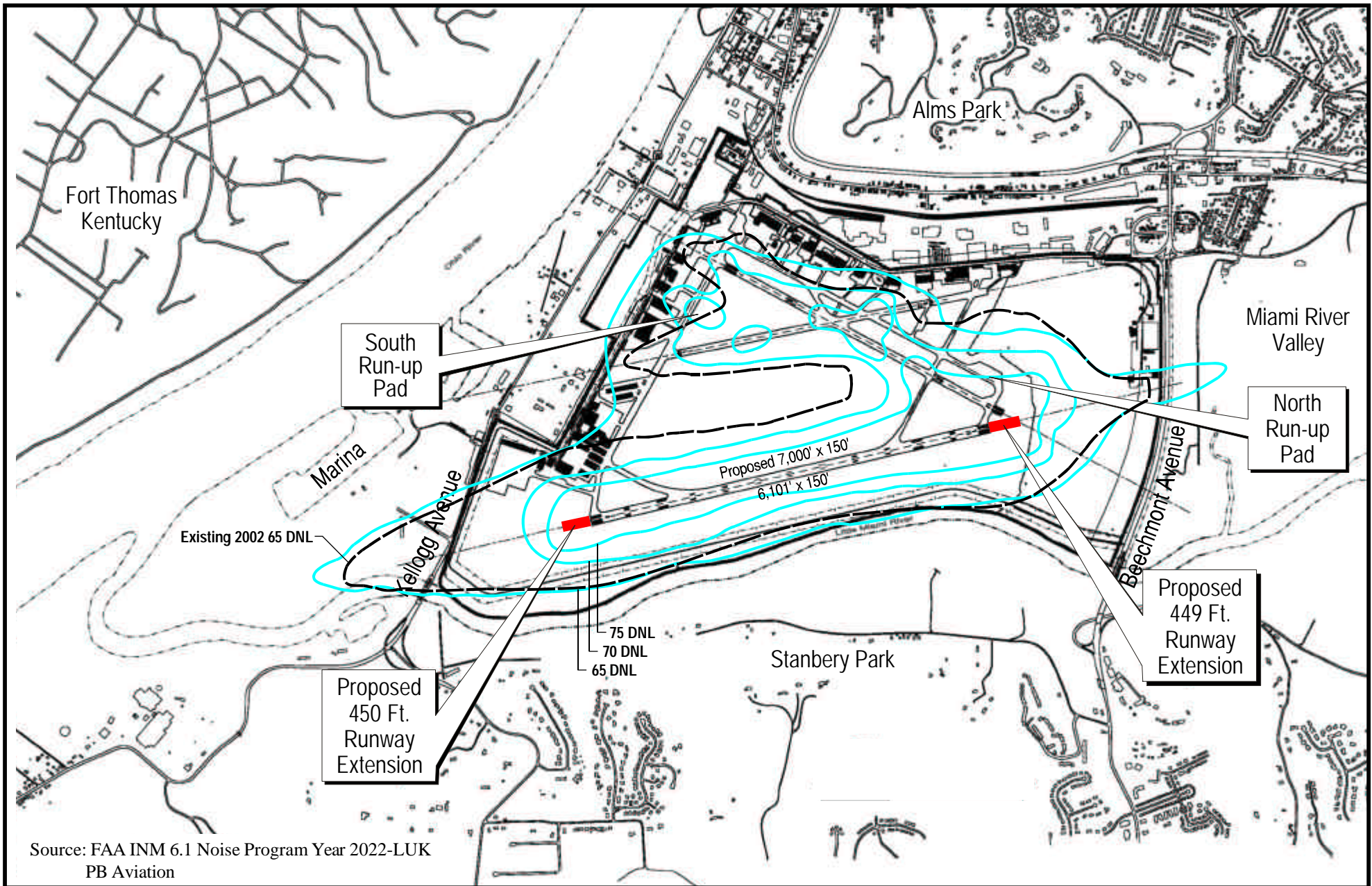
0 1,000' 2,000'
1" = 2,000'



**ALTERNATIVE B
EXTEND RUNWAY 21L 899 FEET**

EXHIBIT

4-5



**Cincinnati Municipal Airport - Lunken Field
AIRPORT MASTER PLAN STUDY UPDATE**

0 1,000' 2,000'
1" = 2,000'



**ALTERNATIVE C
EXTEND RUNWAY 3R 450 FEET
EXTEND RUNWAY 21L 449 FEET**

EXHIBIT

4-6

- The physical impact to the golf course will include 15 acres for the north hangar development area, four acres for the aviation museum and five acres for the relocation of the Runway 21L RSA.
- The hangar development project on the north airfield will result in additional traffic along Wilmer Avenue.

SUMMARY - LAND USE COMPATIBILITY WITH AREA COMMUNITIES:

- For all three Runway 3R-21L extension alternatives, no residential or commercial facilities are located within the year 2022 65 LDN noise contour. However, Alternative B will have significant impacts to the golf course. One positive impact to the Lunken recreation area will be the development of the proposed aviation museum that requires approximately four acres of golf course land. This project has the potential to attract more people to the area as well as generate revenues from the museum visitors.
- If non-aviation revenue projects such as the aeronautical training college (project A-11) and the airport office park (project B-10) are undertaken by the City, additional jobs will be created and the viability of the commercial areas along Kellogg Avenue will be improved. This potential new development will also result in increased traffic on the area roads, which include Kellogg Avenue, Wilmer Avenue, and Beechmont Avenue, providing additional business opportunities in this area.

Both on-airport and off-airport noise mitigation projects have been addressed in the current FAR Part 150 Noise Mitigation Study, which included the Master Plan option of extending Runway 3R to the south by 899 feet.

4.5 Conclusions and Recommendations

(To be provided)